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EXAMINER	
TORRES, JUAN A	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/748,236	KOENENKAMP, INGO	
	Examiner	Art Unit	
	Juan A. Torres	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 December 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

The drawings are objected to because:

a) The recitation "QP_1" in figure 1 is improper (see page 17 line 10 and page 23 lines 4-5); it is suggested to be changed to "QP_i";

b) They fail to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: "22"; and "32" (see figure 2);

c) They fail to comply with 37 CFR 1.84(p)(4) because

c1) reference character "32" has been used to designate both "IPi control signal" and "QPi control signal" (see figure 2);

c2) reference character "210" has been used to designate both "Digital Signal Processor" and "Clock Recovery circuit" (see figure 10);

c3) reference character "330" has been used to designate both "synch_unit_latch" (figure 14); "sampler" (figure 11); and "Cache" (see figure 15);

c4) reference character "320" has been used to designate both "Clock phone interpolation" (figure 11) and "Power Supply" (see figure 15);

c5) reference character "310" has been used to designate both "4 phase gen. Clock/2" (figure 11) and "RAM" (see figure 15);

c6) reference character "340" has been used to designate both "Decoder" (figure 11) and "Chipset" (see figure 15);

c7) reference character "350" has been used to designate both "filter" (figure 11) and "geographical interface" (see figure 15); and

c8) reference character "360" has been used to designate both "phase position accumulator" (figure 11) and "network interface" (see figure 15);

d) The recitation "R-" in figure 5 is improper (see page 10 line 8 and figure 7); it is suggested to be changed to "RI-";

e) The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: "5" and "6" (figure 1, see page 4 lines 14-16); "DRI+", "DRQ+","DRI-" (see page 14 line 19); " RQ" " and " RI" " (see page 10 lines 7-8); "220" (see page 15 line 3).

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New

Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The Applicant is reminded that 35 USC § 112 first paragraph indicates that "The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms".

The disclosure is objected to because of the following informalities:

a) The recitation in page 1 line 2 from the bottom "and others Generally" is improper because it is not properly constructed; it is suggested to be changed to "and others generally";

b) The recitation in page 4 lines10-11 "Referring to FIG. 1, the clock signal recovery circuit 1 includes a pair of phase interpolators 2 and 3 which respectively shift phases of quadrature (Q) and in-phase (I) signals based on control information (IP_i, QP_i) generated by controller 4" is improper (see figure 1); it is suggested to be changed to "Referring to FIG. 1, the clock signal recovery circuit 1 includes a pair of phase interpolators 2 and 3 which respectively shift phases of in-phase (I) and quadrature (Q) signals based on control information (IP_i, QP_i) generated by controller 4";

c) The recitation in page 9 line 9 "The signals may optical signals" is improper because it is not properly constructed; it is suggested to be changed to "The signals may be optical signals";

d) The recitation in page 14 second line from the bottom "(DRI+, DRQ+, DRI-, DRI-)" seems to be improper; it seems that should be changed to "(DRI+, DRQ+, DRI-, DRQ-)" (emphasis added);

e) In all the Specification, the recitation "Δφ" is improper (see figure 9); it is suggested to be changed to "ΔΦ" (see i.e. page 12 line 6, line 13, line 14, line 16; page 13 line 7, line 9)

f) In all the Specification, the recitation "90E" is improper because it is not properly constructed; it is suggested to be changed to "90 degrees" (see i.e. page 12 line 13, line 14, line 15; page 13 line 7, line 9)

g) In all the Specification, the recitation ""Δφ" is improper (see figure 9); it seems that should be changed to "±ΔΦ" (see i.e. page 12 line 13; page 13 line 7).

h) In all the Specification, the recitation "RQ^{+}", "RQ^{-}"; "RI^{+}"; "RI^{-}" is improper (see figure 9); it is suggested to be changed to "RQ+", "RQ-"; "RI+"; "RI-" respectively (see i.e. page 12 line 6, line 8, line 9, lines 12-22; page 13 lines 3-20)

i) In all the Specification, the recitation " RQ" " and " RI" " is not understood what means (see i.e. page 10 lines 7-8)

j) The recitation in page 16 line 3 "requency" is improper because it is not properly constructed; it is suggested to be changed to "frequency";

Appropriate correction is required.

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is

requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 8-15 and 25-29 are rejected under 35 U.S.C. 102(b) as being anticipated by Becker (US 5612975 A).

As per claim 1, Becker discloses a first interpolator to adjust a phase of an in-phase signal (figure 2, block 50 in the in-phase branch; column 5 line 52 to column 6 line 17); and a second interpolator to adjust a phase of a quadrature signal (figure 2, block 50 in the quadrature branch; column 5 line 52 to column 6 line 17), where the second interpolator adjusts the quadrature signal phase independently from the phase adjustment of the in-phase signal performed by the first interpolator (figure 2, block 60 column 7 lines 5-23 controls the in-phase and quadrature interpolators independently).

As per claim 2, Becker discloses claim 1, Becker also discloses that a non-orthogonal relationship exists between the adjusted phases of the quadrature and in-phase signals (column 6 lines 18-52).

As per claim 3, Becker discloses claim 1, Becker also discloses that the second interpolator adjusts the quadrature signal phase based on one or more predetermined increments (column 6 lines 34-52 "time increment quantization").

As per claim 8, Becker discloses claim 1, Becker also discloses that a controller which sets at least one configuration value of the second phase interpolator (figure 2, block 60 column 7 lines 5-23 controls the in-phase and quadrature interpolators independently), where the second phase interpolator adjusts the quadrature signal phase independently from the phase of the in-phase signal based on said at least one configuration value (figure 2, block 60 column 7 lines 5-23 controls the in-phase and quadrature interpolators independently).

As per claim 9, Becker discloses claim 8, Becker also discloses that at least one configuration value includes an offset value for the quadrature signal phase (figure 2, block 60 column 7 lines 5-18).

As per claim 10, Becker discloses a demodulator to generate in-phase and quadrature signals from a data signal (figure 2, blocks 30, 32, and 34; column 4 lines 40-50); and a phase adjuster to adjust a phase of the quadrature signal independently from a phase of the in-phase clock signal (figure 2, block 50 column 5 line 52 to column 6 line 17), wherein the adjusted phase of the quadrature signal corresponds to a clock signal (figure 2, block 60 column 7 lines 5-23).

As per claim 11, Becker discloses claim 10, Becker also discloses a non-orthogonal relationship exists between the adjusted phases of the quadrature and in-phase signals (column 6 lines 18-52).

As per claim 12, Becker discloses claim 10, Becker also discloses that the phase adjuster adjusts the quadrature signal phase based on one or more predetermined increments (column 6 lines 34-52 "time increment quantization").

As per claim 13, Becker discloses claim 10, Becker also discloses a sampler that samples the data signal based on said clock signal (figure 2 block 57 column 6 lines 62-67).

As per claim 14, Becker discloses generating in-phase and quadrature signals from a data signal (figure 2, blocks 30, 32, and 34; column 4 lines 40-50); and adjusting a phase of the quadrature signal independently from a phase of the in-phase signal (figure 2, block 60 column 7 lines 5-23 controls the in-phase and quadrature interpolators independently).

As per claim 15, Becker discloses claim 14, Becker also discloses that adjusting results in a non-orthogonal relationship between the phases of the quadrature and in-phase signals (column 6 lines 18-52).

As per claim 25, Becker discloses claim 14, Becker also discloses sampling the data signal based on the adjusted quadrature signal phase (figure 2 block 57 column 6 lines 62-67).

As per claim 26, Becker discloses a first circuit (figure 1 block 16 and figure 2 block 65 column 4 lines 18-26; and column 7 lines 27-39); and a second circuit which includes (a) a demodulator to generate in-phase and quadrature signals from a data signal (figure 2, blocks 30, 32, and 34; column 4 lines 40-50); and (b) a phase adjuster to adjust a phase of the quadrature signal independently from a phase of the in-phase clock signal (figure 2, block 50 column 5 line 52 to column 6 line 17), where the adjusted phase of the quadrature signal corresponds to a clock signal used to control the first

circuit (figure 1 block 16 and figure 2 block 65 column 4 lines 18-26; and column 7 lines 27-39).

As per claim 27, Becker discloses claim 26, Becker also discloses that a non-orthogonal relationship exists between the phases of the quadrature and in-phase signals after said adjustment (column 6 lines 18-52).

As per claim 28, Becker discloses claim 26, Becker also discloses that the phase adjuster adjusts the quadrature signal phase based on one or more predetermined increments (column 6 lines 34-52 "time increment quantization").

As per claim 29, Becker discloses claim 26, Becker also discloses that the first circuit is at least one of a processor and a memory (figure 1 block 16 and figure 2 block 65 column 4 lines 18-26; and column 7 lines 27-39).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 4-7 and 16-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Becker as applied to claim 1 above, and further in view of Lee (US 6801066 B2).

As per claim 4, Becker disclose claim 1, Becker doesn't specifically disclose that the first interpolator adjusts the phase of the in-phase signal to coincide with a predetermined point on an eye diagram. Lee discloses that the first interpolator adjusts the phase of the in-phase signal to coincide with a predetermined point on an eye

diagram (figures 3 and 4 CKI, column 3 line 35 to column 4 line 8). Becker and Lee teachings are analogous art because they are from the same field of endeavor of Quadrature communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the communication system disclosed by Becker the eye diagram technique disclosed by Lee. The suggestion/motivation for doing so would have been to gain efficiency of the system generating two quadrature clock signals being 90 degrees out of phase with each other (Lee column 2 lines 5-9).

As per claim 5, Lee and Becker disclose claim 4, Lee also discloses that the predetermined point is a crossing point on the eye diagram second (figure 3 block 33, column 3 line 35 to column 4 line 8).

As per claim 6, Becker disclose claim 1, Becker doesn't specifically disclose that the second interpolator adjusts the phase of the quadrature signal to coincide with a predetermined point on an eye diagram. Lee discloses that the second interpolator adjusts the phase of the quadrature signal to coincide with a predetermined point on an eye diagram (figures 3 and 4 CKI, column 3 line 35 to column 4 line 8). Becker and Lee teachings are analogous art because they are from the same field of endeavor of Quadrature communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the communication system disclosed by Becker the eye diagram technique disclosed by Lee. The suggestion/motivation for doing so would have been to gain efficiency of the system

generating two quadrature clock signals being 90 degrees out of phase with each other (Lee column 2 lines 5-9).

As per claim 7, Lee and Becker disclose claim 4, Lee also discloses that the predetermined point is a widest point on the eye diagram (figure 3 block 34, column 3 line 35 to column 4 line 8).

As per claim 16 Becker disclose claim 14, Becker doesn't specifically disclose generating a representation of an eye diagram for the data signal; and adjusting the quadrature signal phase to coincide with a first point on the eye diagram. Lee discloses generating a representation of an eye diagram for the data signal (figure 3, column 3 line 35 to column 4 line 8); and adjusting the quadrature signal phase to coincide with a first point on the eye diagram (figures 3 and 4 CKQ, column 3 line 35 to column 4 line 8). Becker and Lee teachings are analogous art because they are from the same field of endeavor of Quadrature communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the communication system disclosed by Becker the eye diagram technique disclosed by Lee. The suggestion/motivation for doing so would have been to gain efficiency of the system generating two quadrature clock signals being 90 degrees out of phase with each other (Lee column 2 lines 5-9).

As per claim 17, Lee and Becker disclose claim 16, Lee also discloses that first point is a widest point on the eye diagram (figure 3 block 34, column 3 line 35 to column 4 line 8).

As per claim 18, Lee and Becker disclose claim 16, Lee also discloses adjusting the in-phase signal phase to coincide with a second point on the eye diagram (figure 3 block 33, column 3 line 35 to column 4 line 8).

As per claim 19, Lee and Becker disclose claim 18, Lee also discloses that the first point is a widest point (figure 3 block 34, column 3 line 35 to column 4 line 8)and the second point is a crossing point in the eye diagram (figure 3 block 33, column 3 line 35 to column 4 line 8).

As per claim 20 Becker disclose claim 14, Becker doesn't specifically disclose mapping a phase of the quadrature signal onto an eye diagram of the data signal; determining a difference between the phase of the quadrature signal and a phase which coincides with a first point on the eye diagram; and adjusting the quadrature signal phase to reduce said difference. Lee discloses mapping a phase of the quadrature signal onto an eye diagram of the data signal (figure 3, column 3 line 35 to column 4 line 8); determining a difference between the phase of the quadrature signal and a phase which coincides with a first point on the eye diagram (figures 3 and 4 block 33 column 3 line 35 to column 4 line 8); and adjusting the quadrature signal phase to reduce said difference (figures 3 and 4 CKQ, column 3 line 35 to column 4 line 8). Becker and Lee teachings are analogous art because they are from the same field of endeavor of Quadrature communications. At the time of the invention it would have been obvious to a person of ordinary skill in the art to incorporate in the communication system disclosed by Becker the eye diagram technique disclosed by Lee. The suggestion/motivation for doing so would have been to gain efficiency of the system

generating two quadrature clock signals being 90 degrees out of phase with each other (Lee column 2 lines 5-9).

As per claim 21, Lee and Becker disclose claim 20, Lee also discloses that the quadrature signal phase is adjusted to at least substantially eliminate said difference (figure 3 block 33, column 3 line 35 to column 4 line 8).

As per claim 22, Lee and Becker disclose claim 20, Lee also discloses that the quadrature signal phase is adjusted in one or more predetermined increments to reduce said difference (figure 3 block 34, column 3 line 35 to column 4 line 8).

As per claim 23, Lee and Becker disclose claim 20, Lee also discloses that the first point is a widest point on the eye diagram (figure 3 block 34, column 3 line 35 to column 4 line 8).

As per claim 24, Lee and Becker disclose claim 20, Lee also discloses that the adjusting the quadrature signal phase to reduce said difference does not change the phase of the in-phase signal (figures 3 and 4 blocks 29a and 29b, column 3 line 35 to column 4 line 12).

Claim 30 is are rejected under 35 U.S.C. 103(a) as being unpatentable over Becker as applied to claim 26 above, and further in view of Troemel (US 20020163981 A1). As per claim 30 Becker disclose claim 14, Becker doesn't specifically disclose the first circuit and second circuit are included on a same chip die. Troemel discloses using a same chip die (paragraph [0047]). Becker and Troemel teachings are analogous art because they are from the same field of endeavor of Quadrature communications. At the time of the invention it would have been obvious to a person of ordinary skill in the

art to incorporate in the communication system disclosed by Becker the single die technique disclosed by Troemel. The suggestion/motivation for doing so would have been to save cost and space, and to improve performance (Troemel paragraph [0047]).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

a) Cordell (US 4821296 A) discloses a digital phase aligner with outrigger sampling;

b) Wada (US 5602879 A) discloses a digital demodulator for demodulating signal waves modulated by digital signals, and also relates to AFC (Automatic Frequency Control) circuits, clock recovery circuits and bit error estimation circuits respectively used for that digital demodulator;

c) Knutson (US 5878088 A) discloses a timing recovery system suitable for use in a digital signal receiver, such as a cable or satellite television receiver, receiving a quadrature amplitude modulated (QAM) signal; and

d) Crawford (US 20040037366 A1) discloses he use of bandpass sampling techniques for precision modulation and demodulation of multicarrier modulation schemes including independent interpolation of the in-phase and quadrature signals.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juan A. Torres whose telephone number is 571-272-3119. The examiner can normally be reached on 8-6 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Juan Alberto Torres
03-20-2007